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electrical output; [, whereby a user of said controller may be provided proportional control of action intensity of electronic imagery.]

the at least one said sensor includes pressure-sensitive variable-conductance material means for changing electrical conductance dependant upon the pressure applied;

a resilient dome cap operatively associated with said pressure-sensitive variable-conductance material means.

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2. (once amended) An improved controller in accordance with claim 1 wherein the controller has only a single said housing, said housing structured to be held by two hands simultaneously; said housing having a left-hand area and right-hand area; the hand areas positioned oppositely disposed from one another.

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3. (twice amended) An improved controller in accordance with claim 2 wherein [at least four of said electricity manipulating devices are sensors having pressure-sensitive variable-conductance material] the at least one said sensor is positioned in said right-hand area of said housing, said sensor for being activated by at least one of a human user's right hand digits.

[for creating said analog electrical output proportional to varying physical pressure applied to at least four of said depressible surfaces of said plurality of depressible surfaces.]

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4. (once amended) An improved controller in accordance with claim 3 further including a four-way rocker for control functions which are at least partly spatial in nature, such as aiming functions associated with steering a simulated car, airplane and controlling directional movement of a character;

said four-way rocker located in one of the hand areas;

said at least one depressible surface positioned in the hand area oppositely disposed from the location of said four-way rocker,

said at least one depressible surface for timing functions

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such as those associated with firing a simulated gun, and jumping of a simulated character.

[wherein said at least four of said depressible surfaces comprises a four-way rocker having four co-dependant areas with each one of said areas positioned over one each of said four electricity manipulating devices, one said area per one said electricity manipulating device.]

5. (twice amended) A game controller structured to be held by a human user in two hands simultaneously, said controller comprising:

[a] housing means for being held by the human user; a plurality of depressible individual buttons [surfaces] exposed on said housing means and depressible by digits of the user's hands to operate

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electricity manipulating devices contained within said housing means and operated for manipulating electrical outputs of said electricity manipulating devices by depression of said depressible individual buttons [surfaces]; at least one of said electricity manipulating devices including

[pressure-sensitive variable-conductance material] means for creating an analog electrical output proportional to varying physical pressure applied by at least one depressible individual button [surface] of the plurality of depressible individual buttons [surfaces];

means for outputting a signal to an image generation machine, said [a] signal at least representational of said analog electrical output. [, whereby a user of said controller may be provided proportional control of action intensity of electronic imagery.]

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6. (once amended) A game controller in accordance with claim 5 wherein said housing means is structured as a single housing [the controller has only a single said housing, said housing structured] to be held by two hands simultaneously.

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7. (twice amended) A game controller in accordance with claim 6 wherein said means for creating an analog electrical output includes pressure-sensitive variable-conductance material comprising a rubbery binder and active material.

[including at least four of said electricity manipulating devices including pressure-sensitive variable-conductance material for creating said analog electrical output proportional to varying physical pressure applied to at least four of said depressible surfaces of said plurality of depressible surfaces.]

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8. (once amended) A game controller in accordance with claim 7 wherein said active material includes carbon.

[at least four of said depressible surfaces comprises a four-way rocker having four co-dependant areas with each one of said areas positioned over one each of said four electricity manipulating devices, one said area per one said electricity manipulating device.]

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9. (twice amended) A game controller comprising a housing to be grasped and held simultaneously by two hands of a human user with thumbs of the grasping hands remaining free of grasping responsibilities; said housing including a right-hand area and a left-hand area, said right-hand area being an area for grasping by the user's right hand, said left-hand area being an area for grasping by the user's left hand;

a plurality of depressible individual buttons [surfaces] each at least in-part exposed on said housing in at least [one] said right-hand area, said plurality of depressible individual buttons [surfaces] positioned on said housing to be within reach of the user's right-hand thumb with the user's hand grasping said housing in said at least [one] said right-hand area;

a plurality of electricity manipulating devices each [individually] operatively associated with a [single] depressible individual button [surface] of said plurality of depressible

individual buttons [surfaces, one of the electricity manipulating devices per each one of the depressible surfaces]; each of [the] said electricity manipulating devices contained at least in-part within said housing and capable of electrical output manipulation upon physically applied depressive pressure of its associated depressible individual button [surface] of said plurality of depressible individual buttons [surfaces];

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at least one of said electricity manipulating devices [device] including [pressure-sensitive variable-conductance material] means for creating an analog electrical output proportional to varying applied physical pressure;

means for outputting to an image generation machine a signal at least representational of said analog electrical output. [, whereby a user of said controller may be provided proportional control of action intensity of electronic imagery.]

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10. (twice amended) A game controller in accordance with claim 9 wherein said means for creating an analog electrical output includes pressure-sensitive variable-conductance material comprising an elastic binder and active material.

[including at least four of said electricity manipulating devices including pressure-sensitive variable-conductance material for creating said analog electrical output proportional to varying physical pressure applied by at least four of said depressible surfaces of said plurality of depressible surfaces.]

11. (once amended) A game controller in accordance with claim [10] 9 wherein said left-hand area includes a four-way rocker.

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[at least four of said depressible surfaces comprises a four-way rocker having four co-dependant areas with each one of said areas positioned over one each of said four electricity manipulating devices, one said area per one said electricity manipulating device.]

12. (once amended) An improved method of using a game controller of the type structured to be held by a user in two hands simultaneously, the controller connected to an image generation machine connected to a visual display, in which a user's hand digits depress individual buttons [surfaces] upon a housing of the controller to manipulate imagery on the display, wherein the improvement includes;

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depressing at least one of said individual buttons [surfaces] with varying degrees of pressure [to manipulate] for manipulating imagery in proportion to the degree of depressive pressure.

Concl. 13. (once amended) An improved method in accordance with claim 12 further including

grasping said housing in each of two hands simultaneously when depressing at least one of said individual buttons.
[surfaces.]

14. (twice amended) An improved method of controlling action intensity of imagery within a visual display by way of depressing a depressible individual button [surface] on a housing of a two-hand held controller linked to an image generation machine which in turn is linked to the display; wherein the improvement includes the step

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depressing said depressible individual button [surface] with varying degrees of pressure [to vary conductance of pressure-sensitive variable-conductance material] for varying the action intensity of the imagery proportional to the degree of depressive pressure.

15. (twice amended) An improved method in accordance with claim 14 further including

grasping said housing in each of two hands simultaneously when depressing said depressible individual button; [surface.]
depressing said depressible individual button with

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increasing degrees of pressure for increasing the action intensity of the imagery;

depressing said depressible individual button with decreasing degrees of pressure for decreasing the action intensity of the imagery.

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16. (twice amended) An improved method of manufacturing a two-hand held type controller manufactured by way of assembling into a housing [a circuit board including] circuitry formed to be at least in-part a component of electricity manipulating devices and [applying] installing single digit depressible buttons [surfaces] in-part exposed on said housing and positioned to be depressed onto said electricity manipulating devices, wherein the improvement comprises;

installing into said controller at least one pressure-sensitive variable-conductance sensor [material] for creating an analog electrical output in proportion to pressure applied to at least one of said depressible buttons [surfaces];

installing into said controller means for outputting to an image generation machine a signal at least representational of said analog electrical output for providing a user of the controller proportional control of action intensity of electronic imagery.

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18. (twice amended) An improved method of manufacturing a two-hand held type controller in accordance with claim 17 further including installing into said controller said at least one pressure-sensitive variable-conductance sensor of a type including carbon. [material having a wide variable resistance range as a function of depressive pressure.]

19. (twice amended) An improved method of manufacturing a two-hand held type controller in accordance with claim 18 further including installing into said controller said pressure-sensitive variable-conductance sensor [material] having an active material of tungsten carbide within an elastic binder.

REMARKS

The prior art earlier submitted and discussed by Applicant in the 10/01/97 application filing and in the Pre-examination amendment of June 1999, paper #3, as well as the prior art supplied in the Office Action of 08/18/99 has been carefully reviewed and compared with the claims 1-19 as they read after the entering of the above amendments. Claims 1-19 as amended above are believed allowable over the prior art of record, and it is respectfully requested the claims be held allowable within the framework of the U.S. patenting system, and in accord with the spirit with which our Founding Fathers established the U.S. Patent system when they wrote in the U.S. Constitution "To promote the Progress of Science and useful Arts, by securing for limited Times to Authors and Inventors the exclusive Right to their respective Writings and Discoveries".

"If" the Examiner notes a mistake in the amendments above, such as a word added but not underlined, or a word deleted (missing) and not bracketed, which is easy to do even though I thoroughly checked for such mistakes, would the Examiner please be so kind as to assist Applicant with correcting such mistakes, such as by an Examiner's amendment for example. Thank you.

Claim 1 as amended above, as well as the other claims as amended, will herein below generally be simply referred to by the claim number without saying "as amended" or "as amended above" each time. Claims 17 has not been amended since its original submission.

Claim 1 is clearly a novel structural combination, having many structural features in combination defining an advancement in the art. As will be demonstrated by discussion below, claim 1 depicts a novel and unanticipated structural combination which provides new and useful benefits clearly not anticipated in any individual prior art reference or by any reasonable combination

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of the prior art references of record. One major structural distinction in the combination of features of claim 1 from the prior art is the inclusion of at least one depressible surface acting on a "pressure-sensitive variable-conductance sensor" for creating an analog electrical output "proportional" or in relation to varying physical pressure applied to the depressible surface.

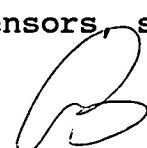
The wording "pressure-sensitive variable-conductance sensor" as used in the instant specification and claims is not meant to and does not include positional detecting devices such as potentiometers, rotary encoders and the like which are not able to function in a variable electrical manner without substantial travel or positional change of at least one actuator component thereof. The pressure-sensitive variable-conductance sensor of the present application and claims does NOT "require" any travel or travel detectable of the human finger or thumb tip by any sensor related component in order to vary electrical output proportional to applied pressure. The absence of a requirement of travel in the analog sensor in the instant invention is because the pressure-sensitive sensor is a PRESSURE reading or PRESSURE detecting sensor structured for reading applied finger pressure and changes in the applied finger pressure, NOT for reading travel and NOT for reading positional changes of the amount required by potentiometers, rotary encoders, hall effect sensors and the like (travel-dependent analog devices). Potentiometers, rotary encoders, hall effect sensors and the like are positional sensing (travel-dependent) devices, and are not pressure sensing (pressure-sensitive) devices and are NOT capable of varying electrical output unless travel or positional changes occur. This substantial travel required in such travel-dependent analog devices is a significant disadvantage in many instances.

As a first instance, when depressing an individual surface with a finger or thumb as in the instant invention, the human being is far more capable of readily detecting differences in "pressures" than in distance traveled or in the new position of

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the finger. Even slight differences in pressures against a compressible surface by a finger or thumb tip can be readily detected, thus allowing very accurate control for one advantage. The feel or firmness of such pressure against a compressible surface is a continuous feedback to the user of the level of pressure applied by the user's finger or thumb, with this constant and accurate feedback being very desirable when the electrical output of the sensor or controller and thus action intensity of the game (or the like) is proportional to the pressure applied to the compressible surface. Detecting differences in location along a stroke path from a starting point in travel by feel with the finger or thumb tip, particularly travel distances which might be associated with a gear and button drive potentiometer or the like as disclosed by applicant as prior art in paper No. 3, is very difficult and in the very least provides a far less intuitive control arrangement. With the inferior travel-dependent button analog device, the human user is not able to easily detect by feel where in the travel stroke, and thus electrical point or setting from the starting point, the button is at any given depressed position. The user of the instant invention can very readily feel the differences in applied pressure to the compressible surface. By constantly feeling the amount (and any changes) of pressure applied by the digit (a user's thumb or finger) against the compressible surface of the pressure-sensitive variable-conductance sensor, a truly natural and intuitive, accurate game controller compressible surface (button) is provided, and the output associated with the compressible surface from the controller is proportional to the applied pressure, wherein high pressure on the compressible surface is arranged to correlate with some aspect such as high rate of gun fire or character running speed or character jumping height, distance or the like, as detailed in the present specification.

As a second instance of significant disadvantage of positional sensing analog sensors, such travel-dependent analog



devices are more expensive in all embodiments (known to Applicant) than the pressure-sensitive sensors used in the instant invention.

As a third instance of significant disadvantage of such travel-dependent analog devices is the typical use of gears, magnets or related moving parts which are more troublesome and less durable than the pressure-sensitive sensor of the instant invention.

As a fourth instance of significant disadvantage of such travel-dependent devices, is that many aspects of electronic games or functions thereof, particularly timing related functions, are much easier and more accurately controlled by the use of a non-position dependent sensor (no travel required) "pressure-sensitive" sensor.

Keeping the above in mind, Inoue et al do not disclose the use of analog sensors or analog output in a two hand game controller, and Rutledge et al do not disclose one or more depressible surfaces acting upon pressure-sensitive variable-conductance sensors (material) for providing an analog electrical output depending upon and proportional to the amount of pressure applied to an associated depressible surface. Rutledge et al is concerned with functions of a tilttable joystick for cursor control, and is not concerned with and thus does not address or suggest any structure involving individual finger depressible surfaces or buttons actuating pressure-sensitive variable-conductance sensors as in the present claims. Thus, a combination of the disclosures of Inoue et al and Rutledge et al cannot reasonably be said to suggest the structural combination of elements of claim 1 as amended above in order to achieve the benefits and advantages provided by the invention of claim 1 as amended above, therefore, claim 1 as above amended is respectfully requested to be held allowable of the Inoue et al and Rutledge et al references. There is no combination of the other prior art of record, i.e., Inoue et al, Shirai, Date et al, Kato, Asher, Bouton, Armstrong (both), Mitchell, Rutledge et al,

O'Mara et al and Asher, which can be reasonably combined to be held to suggest the claim 1 invention, and thus claim 1 should be held allowable over all of the prior art of record for the above stated reasons in the least. Furthermore, claim 1 additionally states the pressure-sensitive variable-conductance sensor includes pressure-sensitive variable-conductance material which changes electrical conductance dependant upon applied pressure. Further, the pressure-sensitive variable-conductance material is stated as being operatively associated with a dome cap. There is quite a bit of information regarding the dome cap in the instant specification. Claim 1 is clearly patentably different than the prior art and any reasonable combination of the prior art, and should be held allowable.

Claims 2-4 depend on claim 1 which is allowable as above demonstrated, and specifically recite the invention in even further narrowed terms, and thus should also be held allowable over the prior art of record.

Claim 5 and thus its dependant claims 6-8 is allowable over the prior art of record because claim 5 includes in the combination of elements "depressible individual buttons" and "means for creating an analog electrical output proportional to varying physical pressure applied by at least one depressible individual button of the plurality of the depressible individual buttons". Such a combination is not described or suggested in the prior art of record, thereby claims 5-8 should be held allowable.

Claim 9 and thus its dependant claims 10-11 is allowable over the prior art of record because claim 9 includes in the combination of elements "a plurality of depressible individual buttons each at least in-part exposed on said housing in at least said right-hand area, said plurality of depressible individual buttons positioned on said housing to be within reach of the user's right-hand thumb with the user's hand grasping said



housing in said at least said right-hand area" plus "means for creating an analog electrical output proportional to varying applied physical pressure" applied to at least one of the depressible individual buttons. Thus, claim 9 and its dependant narrower claims 10-11 should be held allowable over the prior art.

Claims 12-15 are novel and patentable because of the teaching of a new method of use of a game controller having individual buttons and including "depressing at least one of said individual buttons with varying degrees of pressure for manipulating imagery in proportion to the degree of depressive pressure". Applicant herein asserts that in claims 12-15 the wording "varying degrees of pressure" is not associated with user manipulation for actuation of positional sensing (travel-dependent) sensors, as discussed in detail above. The Examiner is reminded of the above discussed differences and disadvantages of travel-dependent sensors, some of the disadvantages discussed above being disadvantages in the method of use. The method of use of claims 12-15 is useful, novel and inventive, offering significant advantages to the game manufacturer, software developer and end user. Thus claims 12-15 should be held allowable over the prior art.

Claim 16 and its dependant claims 17-19, is allowable because of the novel combination of elements which include

"installing into said controller at least one pressure-sensitive variable-conductance sensor for creating an analog electrical output in proportion to pressure applied to at least one of said depressible buttons; and installing into said controller means for outputting to an image generation machine a signal at least representational of said analog electrical output for providing a user of the controller proportional control of action intensity of electronic imagery". The method of manufacture of claims 16-19 is useful, novel and inventive,



offering significant advantages. Thus claims 16-19 should be held allowable over the prior art.

While the above claims 1-19 as amended are believed clearly allowable simply with a comparison thereof to the prior art, the Examiner is respectfully requested to additionally consider the opinion of objective, real-world experts in the art. This expert objective opinion of "inventiveness" is indicated by the attached copy of a check for \$50,000.00 initial payment against future royalties.

The check is from Mad Catz, Inc., an American company with offices and facilities in California. The check was written as an advance on royalties for the instant invention. Mad Catz, Inc. is an extremely successful company specializing in two hand-held game controllers, having sold approximately 10 million units through retail chains such as Walmart, Toys R Us and many others.

Mad Catz employs mechanical, electronic, software and production engineers who are experienced experts in all aspects of game controller design and manufacturing. After careful review by Mad Catz's patent attorney(s), engineers, marketing experts and executives as well as others having substantial expertise in this field, it was concluded that the present invention represents an inventive leap and substantial advancement in the art. Mad Catz believes the substantial advancement in the art represented by my invention is very valuable, and thus established with me a licencing agreement for the invention, paying an up-front advance against royalties of \$50,000.00 as evidenced by the attached check copy.

Clearly, Mad Catz, being a corporation highly experienced in the field, paid an advance against royalties of \$50,000.00 dollars, with a contractual commitment to very substantial on-going royalties, because the Mad Catz experts found the invention to be "useful", "novel" and an "unobvious" inventive advancement of the art.

Such a contract, and substantial advance against future

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royalties, is not made lightly or without great consideration by those skilled in the art of game controllers.

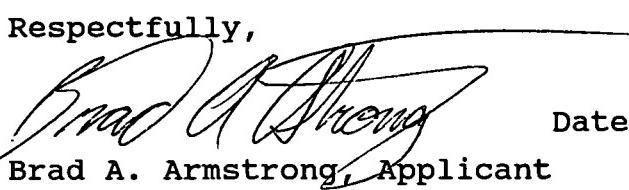
Clearly, my invention is viewed by those skilled in the art as having great value.

In view of the amendments to the claims and the herein remarks favoring allowance, please reexamine my application as now amended and find the claims allowable over the prior art.

Thank you.

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Respectfully,



Brad A. Armstrong, Applicant

Date: November 17, 1999

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ANALOG SENSOR(S)
LICENSE UNDER PATENT APPLICATION, NO. 08/942,450, FILED
OCTOBER 1, 1997 BY INVENTOR BRAD ARMSTRONG.



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